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(54) **FUEL QUILL PASSAGEWAY ASSEMBLY FOR ENGINE**

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(51) **Int. Cl.**

F02M 61/14	(2006.01)
F02M 55/00	(2006.01)
F02M 55/02	(2006.01)
F02M 37/00	(2006.01)
F02M 69/46	(2006.01)

(52) **U.S. Cl.**

CPC ***F02M 61/14*** (2013.01); ***F02M 55/005*** (2013.01); ***F02M 55/02*** (2013.01); *F02M 37/0017* (2013.01); *F02M 69/462* (2013.01)

(58) **Field of Classification Search**

CPC F02M 37/0017; F02M 55/004; F02M 55/005; F02M 55/02; F02M 55/025; F02M 69/46; F02M 69/462; F02M 69/52; F02M 2200/16; F02M 2200/856

See application file for complete search history.

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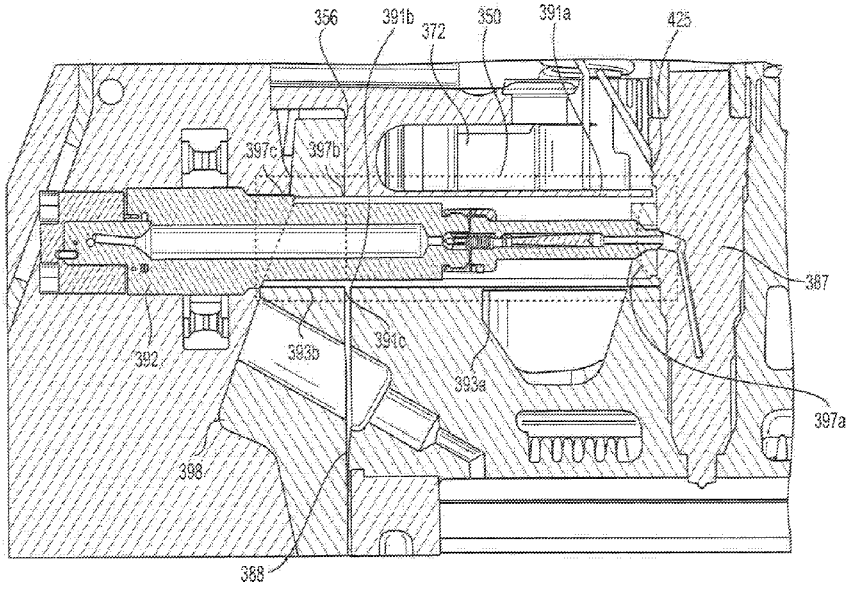
(57) **ABSTRACT**

A fuel quill passageway assembly for an engine is disclosed. The engine includes a head pot; a cylinder head having an outer wall situated adjacent to the head pot, an inner wall, and a water jacket situated between the outer wall and the inner wall; and a fuel injector situated adjacent to the inner wall. The assembly may include a first sleeve extending through an aperture in the head pot toward an aperture in the outer wall of the cylinder head. The assembly may also include a second sleeve extending from the aperture in the outer wall of the cylinder head, through the water jacket, to an aperture in the inner wall of the cylinder head. Additionally, the assembly may include a seal joining the second sleeve to the first sleeve.

20 Claims, 2 Drawing Sheets



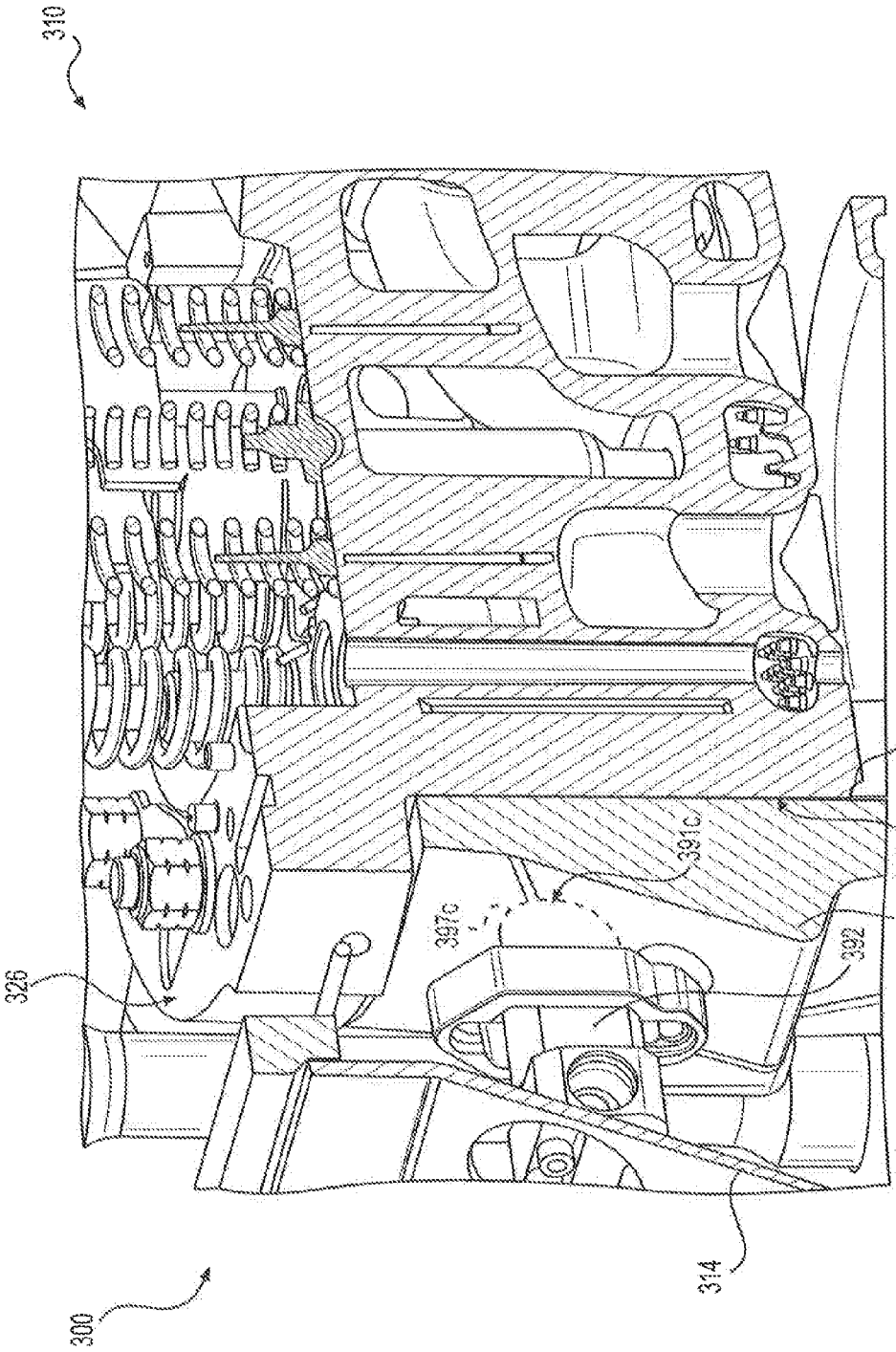


FIG. 1

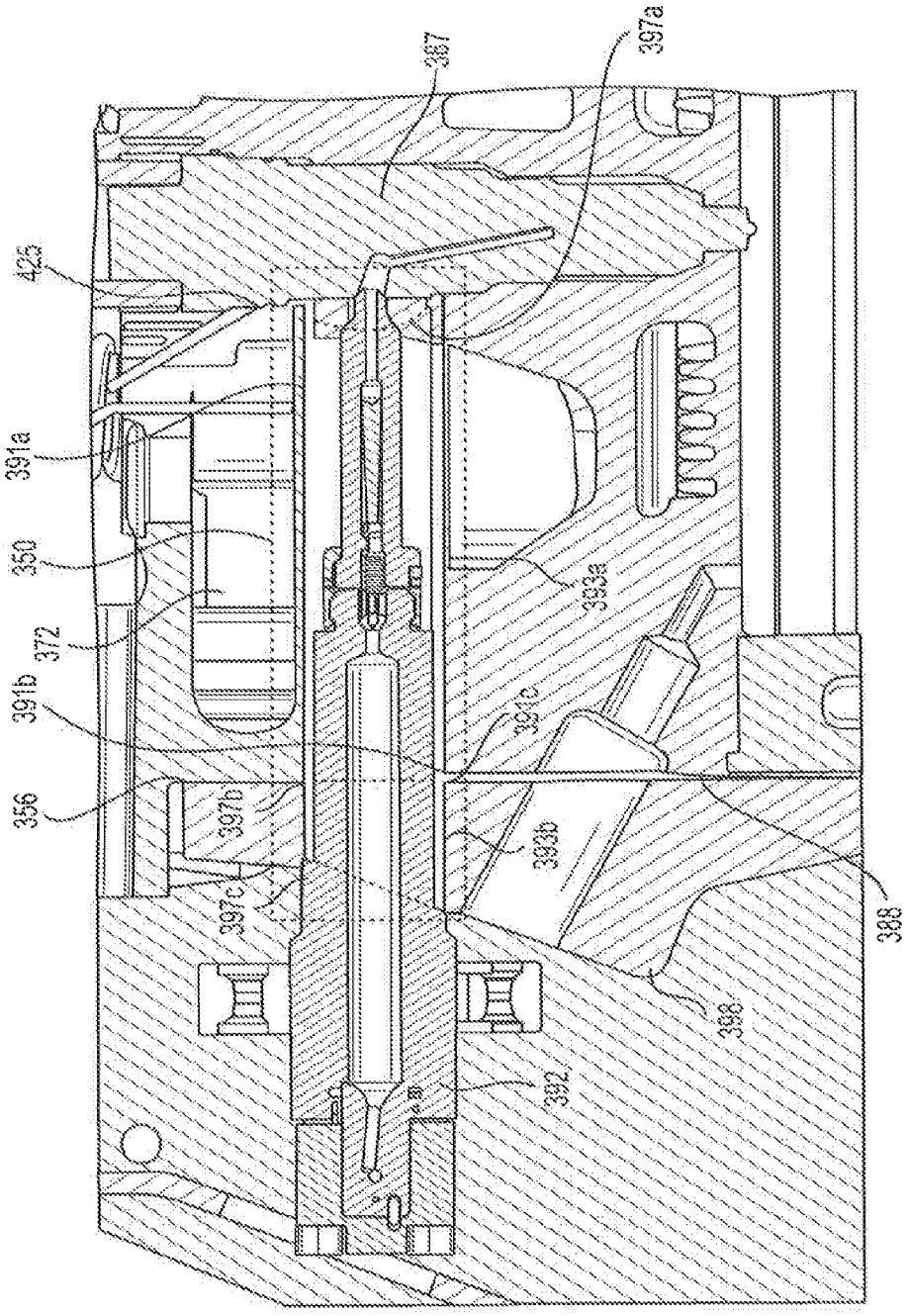

387
397a
425
391a
350
372
391b
356
397b
397c
393a
394c
393b
368
388
392

FIG. 2

FUEL QUILL PASSAGEWAY ASSEMBLY FOR ENGINE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Patent Application No. 61/529,179, filed Aug. 30, 2011; U.S. Provisional Patent Application No. 61/529,183, filed Aug. 30, 2011; and U.S. Provisional Patent Application No. 61/529,185, filed Aug. 30, 2011, all of which are hereby incorporated by reference in their entireties.

TECHNICAL FIELD

The present disclosure relates generally to engines and, more particularly, to fuel quill passageway assemblies for engines.

BACKGROUND

Engines such as, for example, two-stroke diesel engines are used in variety of applications. In some applications, it is desirable to equip the engines with common rail fuel injection systems, which may help reduce emissions. In such systems, a pump provides pressurized fuel to all fuel injectors of an engine using a common rail, which can be connected to each of the fuel injectors via respective fuel quills.

U.S. Pat. No. 5,365,907 to Dietrich et al. ("the '907 patent") discloses a cylinder head for an internal combustion engine. The cylinder head includes a cylindrical recess, which accommodates a pressure tube. The '907 patent discloses that the pressure tube carries fuel from an injection pipe, connected to an injection pump, to a nozzle holder with a fuel injection nozzle (i.e., a fuel injector).

Although the '907 patent discloses that a cylindrical recess of a cylinder head can be used to facilitate the carriage of fuel from a pump through the cylinder head to an injector, certain disadvantages may persist. For example, in some applications, including the cylindrical recess in a cylinder head may undesirably restrict coolant flow through a water jacket of the cylinder head. Additionally, in some applications (e.g., retrofit applications), it may not be possible to cost effectively produce a cylinder head with the cylindrical recess.

The assemblies and engines of the present disclosure may help address the foregoing problems.

SUMMARY

One disclosed embodiment relates to a fuel quill passageway assembly for an engine including a head pot; a cylinder head having an outer wall situated adjacent to the head pot, an inner wall, and a water jacket situated between the outer wall and the inner wall; and a fuel injector situated adjacent to the inner wall. The assembly may include a first sleeve extending through an aperture in the head pot toward an aperture in the outer wall of the cylinder head. The assembly may also include a second sleeve extending from the aperture in the outer wall of the cylinder head, through the water jacket, to an aperture in the inner wall of the cylinder head. Additionally, the assembly may include a seal joining the second sleeve to the first sleeve.

Another embodiment relates to an engine. The engine may include a head pot. The engine may also include a cylinder head having an outer wall situated adjacent to the head pot, an inner wall, and a water jacket situated between the outer wall and the inner wall. Additionally, the engine may include a fuel injector situated adjacent to the inner wall. The engine may also include a first sleeve extending through an aperture in the head pot toward an aperture in the outer wall of the cylinder head. In addition, the engine may include a second sleeve extending from the aperture in the outer wall of the cylinder head, through the water jacket, to an aperture in the inner wall of the cylinder head. Additionally, the engine may include a seal joining the second sleeve to the first sleeve.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross-sectional view of an exemplary engine for use with a common rail fuel injection system; and

FIG. **2** is another cross-sectional view of the engine of FIG. **1**.

DETAILED DESCRIPTION

FIG. **1** illustrates an engine **300** for use with a common rail fuel injection system. Engine **300** may be any type of engine configured to produce power by combusting fuel. For example, engine **300** may be a two- or four-stroke diesel, gasoline, or gaseous fuel powered engine. Regardless of type, engine **300** may include a crankcase **314** housing a crankshaft (not shown) powered by fuel combustion within one or more power assemblies **310**.

Each power assembly **310** may be mounted on a head pot **398** (a welded feature of crankcase **314**), and may include a liner **325** within which fuel is combusted using air received from an airbox (not shown). Power assembly **310** may also include a cylinder head **326** situated above liner **325** to close liner **325**. In addition, power assembly **310** may include a fuel injector **387** (referring to FIG. **2**) and a fuel quill **392** for supplying fuel from a common rail of the fuel injection system (not shown) to fuel injector **387**.

As shown in FIG. **2**, in order to connect the common rail to fuel injector **387**, fuel quill **392** may pass through an aperture **391***c* in head pot **398**, an aperture **391***b* in an outer wall **356** of cylinder head **326** (situated adjacent to head pot **398**), and an aperture **391***a* in an inner wall **425** of cylinder head **326** (situated adjacent to fuel injector **387**). In addition, fuel quill **392** may pass through a water jacket **372** of cylinder head **326** situated between outer wall **356** and inner wall **425**. It is contemplated that fuel quill **392**'s passage through all of these parts of power assembly **310** may result in undesirable leakages of various fluids and/or gasses. For example, coolant from water jacket **372** might leak via apertures **391***a-c* into liner **325** (referring to FIG. **1**), crankcase **314** (referring to FIG. **1**), or the airbox (via a clearance **388** between head pot **398** and cylinder head **326** that is in communication with the airbox). Additionally, pressurized air from the airbox and/or exhaust gas remnants in clearance **388** might leak via apertures **391***a-c* into liner **325**, crankcase **314**, or water jacket **372**. Accordingly, in order to prevent the leakages, power assembly **310** may also include a fuel quill passageway assembly **350** that isolates coolant in water jacket **372** and air and/or exhaust gas remnants in clearance **388** from each other and from other parts of engine **300**.

Fuel quill passageway assembly **350** may include removable sleeves **393***a* and **393***b*, which may be formed from steel and adapted to receive fuel quill **392**. As shown in FIG. **2**, sleeve **393***b* may extend through aperture **391***c* in head pot **398** toward aperture **391***b* in outer wall **356** of cylinder head **326**, and sleeve **393***a* may extend from aperture **391***b* in outer wall **356** of cylinder head **326**, through water jacket **372**, to aperture **391***a* in inner wall **425** of cylinder head **326**.

Fuel quill passageway assembly **350** may also include various seals (e.g., seals **397***a-c*), which may be used to join sleeves **393***a* and **393***b* to each other and/or to other parts of power assembly **310**. For example, seals **397***b* and/or **397***c* may join sleeve **393***b* to aperture **391***c* in head pot **398**. Also, seal **397***b* may join sleeve **393***b* to sleeve **393***a* and/or join sleeve **393***a* to aperture **391***b* in outer wall **356** of cylinder head **326**. In addition, seal **397***a* may join sleeve **393***a* to aperture **391***a* in inner wall **425** of cylinder head **326** and/or to fuel injector **387**. It is contemplated that sleeves **393***a* and **393***b* in combination with seals **397***a-c* may isolate coolant in water jacket **372** and air and/or exhaust gas remnants in clearance **388** from each other and from other parts of engine **300**.

INDUSTRIAL APPLICABILITY

The disclosed engines and assemblies may be used in stationary or non-stationary machines, and may be particularly beneficial when used in machines having limited engine space (e.g., locomotives). The engines and assemblies may facilitate the use of common rail fuel injection systems by, for example, enabling their use on existing machines without requiring cost prohibitive modifications (e.g., expansion of engine bays and/or recasting of engine parts).

For example, fuel quill passageway assembly **350** may allow fuel quill **392** to pass through head pot **398** and cylinder head **326**, thereby allowing a common rail of the common rail fuel injection system to be positioned next to head pot **398**. Such placement may allow the common rail to be positioned within (as opposed to above) crankcase **314** and under a top deck of engine **300**, reducing the amount of additional space required for the common rail fuel injection system and keeping any potential leak path from reaching hot exhaust system components.

In addition, fuel quill passageway assembly **350** may allow for easy installation/removal of the common rail fuel injection system and/or other engine **300** components. For example, given the removable nature of sleeves **393***a* and **393***b*, it may be possible to separately install/remove cylinder head **326**. Additionally, since sleeves **393***a* and **393***b* may, in combination with seals **397***a-c*, isolate coolant in water jacket **372** and air and/or exhaust gas remnants in clearance **388** from each other and from other parts of engine **300**, it may be possible to easily adapt (e.g., by simple machining operations as opposed to recasting operations) an existing cylinder head **326** for use with the common rail fuel injection system. For example, apertures **391***a-c* could simply be machined into head pot **398** and cylinder head **326**, and could be positioned such that sleeve **393***a*, which extends from aperture **391***b* to aperture **391***a*, does not undesirably restrict coolant flow through water jacket **372**.

It will be apparent to those skilled in the art that various modifications and variations can be made in the disclosed assemblies and engines without departing from the scope of the disclosure. Other embodiments of the disclosed assemblies and engines will be apparent to those skilled in the art from consideration of the specification and practice of the assemblies and engines disclosed herein. It is intended that the specification and examples be considered as exemplary only, with a true scope of the disclosure being indicated by the following claims and their equivalents.

What is claimed is:

1. A fuel quill passageway assembly for an engine including a head pot; a cylinder head having an outer wall situated adjacent to the head pot, an inner wall, and a water jacket situated between the outer wall and the inner wall; and a fuel injector situated adjacent to the inner wall, the fuel quill passageway assembly comprising:

a first sleeve extending through an aperture in the head pot toward an aperture in the outer wall of the cylinder head;

a second sleeve extending from the aperture in the outer wall of the cylinder head, through the water jacket, to an aperture in the inner wall of the cylinder head; and

a seal joining the second sleeve to the first sleeve.

2. The fuel quill passageway assembly of claim **1**, wherein the seal also joins the second sleeve to the aperture in the outer wall of the cylinder head.

3. The fuel quill passageway assembly of claim **2**, wherein the seal also joins the first sleeve to the aperture in the head pot.

4. The fuel quill passageway assembly of claim **1**, wherein the seal also joins the first sleeve to the aperture in the head pot.

5. The fuel quill passageway assembly of claim **1**, comprising a seal joining the second sleeve to the aperture in the outer wall of the cylinder head.

6. The fuel quill passageway assembly of claim **1**, comprising a seal joining the first sleeve to the aperture in the head pot.

7. The fuel quill passageway assembly of claim **1**, comprising a seal joining the second sleeve to the fuel injector.

8. The fuel quill passageway assembly of claim **7**, wherein the seal joining the second sleeve to the fuel injector also joins the second sleeve to the aperture in the inner wall of the cylinder head.

9. The fuel quill passageway assembly of claim **1**, comprising a seal joining the second sleeve to the aperture in the inner wall of the cylinder head.

10. The fuel quill passageway assembly of claim **1**, comprising a seal joining the second sleeve to the aperture in the inner wall of the cylinder head and the fuel injector, wherein the seal joining the second sleeve to the first sleeve also (i) joins the second sleeve to the aperture in the outer wall of the cylinder head, and (ii) joins the first sleeve to the aperture in the head pot.

11. An engine comprising:

a head pot;

a cylinder head having an outer wall situated adjacent to the head pot, an inner wall, and a water jacket situated between the outer wall and the inner wall;

a fuel injector situated adjacent to the inner wall;

a first sleeve extending through an aperture in the head pot toward an aperture in the outer wall of the cylinder head;

a second sleeve extending from the aperture in the outer wall of the cylinder head, through the water jacket, to an aperture in the inner wall of the cylinder head; and

a seal joining the second sleeve to the first sleeve.

12. The engine of claim **11**, wherein the seal also joins the second sleeve to the aperture in the outer wall of the cylinder head.

13. The engine of claim **12**, wherein the seal also joins the first sleeve to the aperture in the head pot.

14. The engine of claim **11**, wherein the seal also joins the first sleeve to the aperture in the head pot.

15. The engine of claim **11**, comprising a seal joining the second sleeve to the aperture in the outer wall of the cylinder head.

16. The engine of claim **11**, comprising a seal joining the first sleeve to the aperture in the head pot.

17. The engine of claim **11**, comprising a seal joining the second sleeve to the fuel injector.

18. The engine of claim **17**, wherein the seal joining the second sleeve to the fuel injector also joins the second sleeve to the aperture in the inner wall of the cylinder head.

19. The engine of claim **11**, comprising a seal joining the second sleeve to the aperture in the inner wall of the cylinder head.

20. The engine of claim **11**, comprising a seal joining the second sleeve to the aperture in the inner wall of the cylinder head and the fuel injector, wherein the seal joining the second sleeve to the first sleeve also (i) joins the second sleeve to the aperture in the outer wall of the cylinder head, and (ii) joins the first sleeve to the aperture in the head pot.

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